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OF THE CHILDREN'S HOSPITAL

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PEDIATRICS IN JAPAN

Gordon W. Daisley, Jr., M.D.*

Because of its location on an eastern coast line at approximately the same latitude as Washington, D.C., Tokyo, Japan, enjoys the same weather conditions as that American city, and the incidence of disease in the two cities is closely parallel. While it would be interesting to outline Japanese methods of diagnosis, treatment, and routine pediatric care (they are far different from ours), this paper discusses a few diseases seen in American children of interest to pediatricians here.

TOKYO-YOKOHAMA ASTHMA

Although climatically the same, there are two major differences in environment between Washington and the Tokyo-Yokohama area. First, the latter is a heavy industrial area, and second, mountain ranges rise sharply just to the west, holding the atmosphere steady for long periods of time.

It became increasingly evident the longer American personnel were in Japan that the Tokyo-Yokohama region had more than its share of asthmatics. Known asthmatics tolerated the area poorly, as a rule, and required frequent hospitalizations to relieve their symptoms. The fall and winter months were especially bad, and there were often six to ten infants and young children in the hospital at the same time with severe asthmatic bronchitis or frank asthma. Many others were being treated as out-patients.

The number of "first attacks" of asthma was also out of proportion to normal expectancy. The pattern soon became established; the first winter spent in Japan was usually asthma-free, but there were 2 or 3 bouts of severe, prolonged upper respiratory infections with lingering, deep, semi-productive cough in susceptible individuals. Antibiotics and antitussives were of little value in curtailing these bouts, which became known simply as "the Tokyo crud". The following fall or winter, wheezing appeared; and when these patients developed upper respiratory infection, the asthma became severe.

There was no age group preference, and many adults were also subject to asthmatic attacks for the first time. About one-third of the patients gave no family history of known allergies. A few were controlled well on antihistaminic therapy; others had attacks infrequently enough to proffer

* While serving in the U. S. Army from 1952 to 1954, the author spent 22 months in Tokyo, Japan. As Pediatric Ward Officer, and later, as Chief of the Pediatric Section in the Army Hospital, he had contact with an area which housed 10,000 dependent children. The following observations of disease entities of interest to the pediatrician were drawn from that experience.

no major problem. But many were in constant difficulty, requiring such drugs as adrenalin, aminophylline or ACTH, to break up the attacks. The progress of these patients was carefully followed by chest x-rays examination and when emphysematous changes occurred, transfer from the region was advised. Usually, even intraisland transfers brought about marked improvement immediately.

It was felt that Tokyo-Yokohama asthma was a serious enough problem to warrant investigation, and accordingly, air-pollution studies in Yokohama and skin-testing in Tokyo were carried out. Several children (and adults) were given extensive skin-tests to the usual allergens. The results were not particularly revealing, since very few showed reaction to dust, pollens, grasses, trees, or molds; but the air-pollution study pointed to the industrial smoke and its chemical residue as the cause. When the winds prevailed so that the residue was trapped by the mountains and hung over the cities, pollution was high of course. It was low when the winds blew from the west. A daily record of the concentration was kept, and was plotted against the number of visits by asthmatics to the out-patient department of the Yokohama Hospital. The 2 lines paralleled so closely on the graph that one could almost predict how many asthmatics would be seen on a given day. To corroborate these findings, and those of the skin-tests, pollen counts had no relation to the number of visits.

While similar conditions are not likely to prevail in this country, the experience in Japan points out an often overlooked cause of asthma.

IZUMI FEVER (NON-STREPTOCOCCAL SCARLET FEVER)

In the spring of 1954, an epidemic swept through the Japanese children and young adults of Tokyo, and sporadic cases occurred in American personnel in the area. The disease was called "Izumi Fever" (named after Dr. Izumi of Tokyo), and was manifest by fever ranging from 102°–104°, marked red throat and strawberry tongue, and a macular blush over the trunk and face. In short, it appeared to be typical scarlet fever.

The striking feature was that no streptococcus could be cultured from the throat, and penicillin did not seem to alter the course of the disease. It was self-limited, lasting about five days, and malaise was not severe. White blood cell counts were usually elevated, with normal differentials as a rule; sedimentation rates were in the range of 20–25 mm./hour. Clinically, the disease could not be differentiated from scarlet fever, except that it was usually milder, and no complications occurred after the disease. Dr. Izumi felt that incubation period was very short. He studied the disease in the Japanese and claimed to have isolated the causative agent, a virus, from throat culture. Unfortunately, the American virology laboratories were unable to study cultures at the time.

"Izumi fever" seemed very contagious in the population, but relatively few Americans contracted the disease. There were as many cases in young adults as in children. It is safe to assume with such rapidly changing personnel that some of our forces brought the disease home. Therefore, it is suggested that in future outbreaks of "typical but mild" scarlet fever, some virus investigation may be in order.

Parenthetically, the American children reversed the procedure with herpangina. The Japanese pediatricians with whom I had contact were completely unaware of such a disease until several cases occurred in our housing areas. It was soon seen in Japanese children, but in much less concentration.

OTHER ILLNESSES

Poliomyelitis was as much an entity in Japan as at home, although the disease is almost unheard of in the natives. In 2 summers, approximately 45 cases were so diagnosed in children at the Tokyo Army Hospital; 4 were bulbar, and 6 paralytic. There was no definite confirmation attempted by virus studies, except that Japanese-B encephalitis was ruled out by blood titres. Each season, the first cases seen had just arrived in Japan, and were obviously incubating the disease during their journey. It seemed likely that these children influenced the spread of the disease, since ordinarily less than 10 cases are reported among Japanese yearly (population 85,000,000). It would of course be interesting to know how many of the populace harbor the virus. In the Tokyo-Yokohama area no American children developed Japanese-B encephalitis during those summers, although there were several cases in local Japanese hospitals. This was surely influenced by preventive measures of screens and DDT sprays, although mosquito bites were fairly common in our personnel.

Very few gastrointestinal disturbances of consequence were encountered. Specific dysenteries did occur, usually caused by Shigella organisms, but prompt treatment kept morbidity low. Amebiasis was diagnosed in adults in amazingly high incidence, often leading the list of medical admissions to the hospital, but only a handful of children had the disease. One wonders whether this indicates that parents were more careful in the preparation and selection of their children's food than of their own.

Ekiri, the Japanese name for fulminating diarrhea in infants, which took countless lives in local hospital nurseries and isolation wards, was not seen in our infants. While the Japanese physicians felt that it was a specific disease (E. coli 0–111) with a grave prognosis from the start, most of our observers thought that a better knowledge of fluid balance, and the use of intravenous solutions would have saved lives in most instances.

ADVANCES IN THE LABORATORY DIAGNOSIS OF SELECTED ENDOCRINE DISEASES, AND A PLEA FOR THE MORE FREQUENT USE OF INDIVIDUAL GROWTH CHARTS IN ROUTINE PEDIATRIC PRACTICE*

H. G. Keitel, M.D.

Many laboratory tests currently used in the diagnosis of endocrine disorders are relative non-specific and the search for definitive chemical tests continues. Even the P.B.I.—the protein bound iodine—determination, which was considered by some to be an infallible test for diagnosing hypothyroidism, is known not to be a completely dependable test for indicating either the concentration of physiologically active thyroid hormone in blood or of the presence of hypothyroidism. A high plasma concentration of P.B.I. has been found in certain patients with lymphocytic thyroiditis, these patients usually having a normal metabolism.

It has been suggested that the B.E.I.—the butanol extractable iodine—determination is preferable to the P.B.I. for ascertaining the blood concentration of physiologically active thyroid hormone. The butanol extractable iodine concentration of plasma in the aforementioned patients with thyroiditis was usually normal, confirming the clinical findings.

The radioiodine uptake test (R.A.I.) has proved to be a serviceable method for rapidly and accurately diagnosing thyroid dysfunction. This test too, however, has limitations because some patients with severe clinical hypothyroidism have a normal R.A.I. uptake. Apparently the thyroid iodine trapping mechanism in these patients is normal. A defect in the synthesis of a physiologically active thyroid hormone (hormones) presumably is present for the P.B.I. and B.E.I. are normal or elevated indicating the presence of non-active thyroid hormone. The ability of KCN rapidly to discharge radioactive iodine in most of these patients is absent, also indicating that a conversion of inorganic iodine to an organic iodine complex has occurred.

Mild hypothyroidism often is a difficult condition to document. If a trial course of thyroid (USP) up to 2 milligrams per Kg. body weight per day results in such findings as a decrease in body weight, improved circulatory and mental status and increased resistance to cold, a presumptative diagnosis of hypothyroidism is indicated even in the absence of diagnostic laboratory findings. The withdrawal of thyroid medication in the hypothyroid subject often results in a marked increase in the cholesterol con-

* From a talk at the scientific program of the Children's Hospital Alumni Association in conjunction with the Joseph Wall Memorial Lectureship.

centration of plasma in from 6–10 weeks, even though the cholesterol concentration was normal before the onset of thyroid therapy. A trial of thyroid is safe in all patients except those with pan-hypopituitarism who may develop adrenal insufficiency.

The treatment of hyperthyroidism with either radiation, surgery or propylthiouracil appears to be satisfactory, although circumstances usually favor the use of propylthiouracil rather than thyroidectomy. As yet the long term effects of radio-iodine therapy are unknown.

Of importance in the diagnosis of certain pituitary and thyroid disorders is the alteration in the R.A.I. uptake following T.S.H. (thyroid-stimulating-hormone) administration. This test is done by observing what percentage of an administered dose of radio iodine is concentrated in the thyroid gland before and after T.S.H. administration. The correction of an abnormally low R.A.I. uptake by the thyroid with T.S.H. would indicate a failure of endogenous T.S.H. production while the absence of an increase in the R.A.I. uptake would indicate an absence, or non-responsiveness, of the thyroid gland.

The R.A.I. uptake method is also useful for detecting the presence of aberrant thyroid tissue, such as lingual, ovarian and thoracic thyroid, and in detecting metastatic thyroid tissue in bone and elsewhere.

The laboratory aids used in diagnosing adrenal steroid excess or deficiency have now become quite specific. While the Kepler-Power-Robinson water test and the glucose and insulin tolerance tests have been serviceable for the presumptive diagnosis of adrenal cortical insufficiency, they have not been completely satisfactory because of occasional adverse clinical effect resulting from the tests, and of the more frequent occurrence of false positive and negative results. The plasma concentration of glucocorticoids, (i.e. the adrenal steroids regulating sugar, nitrogen and possibly water metabolism) following ACTH administration is being used successfully to indicate a deficiency of these adrenal hormones. The treatment of certain patients with the adrenogenital syndrome has not been completely successful because of the occurrence of crises apparently due to deficiency of the adrenal hormone which helps regulate salt and possibly water metabolism. This hormone apparently has been isolated and been named aldosterone. The results of conventional tests used to prove the presence of aldosterone deficiency frequently are inconclusive, i.e. sodium deprivation resulted in equivocal changes in the serum sodium or potassium concentrations and in the body weight. The excretion rate of aldosterone may prove to be definitive test for documenting a deficiency of this steroid. Unfortunately, a time consuming bioassay is still required for aldosterone determination.

Data of the urinary excretion of 17 keto-steroids (17 KST) have proven to be of great value in the diagnosis and treatment of patients with adrenal

hyperplasia. Pediatricians will welcome the availability of a 17 KST method for plasma because multiple 24 hour urine collections are often difficult to procure and are not always complete in infants, and in out-patients.

Adrenal adrenarchy, and hypertrichosis due to an increased sensitivity of hair follicles to 17 KST procursors, are manifested by premature axillary and pubic hair. These two conditions must be differentiated from adrenal hyperplasia and adrenal tumor. The determination of the 17 KST output quickly settles the matter for low levels are found in patients without adrenal disease. A decrease in an abnormally high excretion rate of 17 KST following cortisone therapy occurs in patients with adrenal hyperplasia, while little or no change in the urinary output of 17 KST occurs if an adrenal tumor is present.

Bioassays for several of the pituitary hormones have been reported. These include bioassays for the growth hormone, luteinizing hormone and the antidiuretic hormone. These methods may soon be available for clinical use and along with the F.S.H. (Follicle stimulatory hormone) method, currently available, greatly enhance our knowledge of the role of the pituitary gland in health and disease.

Unfortunately, an assay method for insulin is not available for clinical use although the appearance of many new reports indicate continued interest by many investigators in this problem. The chemical determination of estrogens is still too cumbersome to be of clinical service and the vaginal smear and the clinical findings remain the chief methods used in detecting the presence of estrogens. Perhaps a good qualitative estrogen method will be all that is required for most clinical purposes.

While more specific laboratory methods are improving the diagnosis and therapy of metabolic diseases, it is the family physician who is responsible for locating, at an early stage, derangements in metabolism. I would like to endorse therefore, the wider use, and distribution, of the type of individualized growth charts which plot body weight and height measurements, the two most serviceable indices for detecting disturbances in growth.

Study of the causes of dwarfism show that many conditions such as nutritional, metabolic, psychiatric disorders are associated with decreased growth. Indeed the list of causes of decreased growth includes so many conditions that one can think of growth measurements as serving as barometers of disease. However, physicians generally appreciate the difficulty in detecting the presence of many growth disturbances at an early stage because the normal range of weight and length at any given age encompass a wide range. For example, if one utilized measurements at a single time without reference to previous measurements, a 7 year old child could fail to grow or gain weight for 5 years and still be considered to be normal at 12 years of age. The early recognition of a disturbance in growth is best

accomplished therefore by utilizing data of the previous growth pattern of the individual, because this comparison results in a very much more predictable and expected rate of growth than a comparison with the growth than a comparison with the growth of the average normal subject. Until fairly recently growth charts were primarily used by specialized clinics but now many pediatricians use them in their daily practice. However, as only a small portion of children are seen routinely by the family physician through adolescence, the plotting of height and weight measurements usually stops after the fourth or fifth year. The growth charts maintained by the family physician during infancy should be made available to the school, where further growth measurements are usually made anyway. The measurements made at school likewise should be plotted on the patients own growth curve; any deviations from the predicted curve can rapidly be identified and called to the attention of the family physician. Many school systems already employ individualized medical cards and the reverse side of such cards could easily be used for the individuals own growth curve record.

If such a system were established, the physicians seeing patients with obesity for example, might be referred patients who are but 10–20 pounds over weight rather than 50 or more pounds, by which time the hyperphagia has often become quite fixed.

Psychiatric problems, to take another specific example, may also be identified at an earlier, more reversible stage, for feeding irregularities which are quite common in disturbed children, are commonly associated with abnormal growth curves.

However, it is the physician caring for children who must implement the system which will result in his attention being called to abnormalities in growth at an early stage; he must have available growth data for the first few years of life during which time the individuals own normal growth pattern is established. The subsequent use by the school of his data should emphasize the importance of the individualized aspect of growth and serve our democratic processes far better than by comparing all growth to average normal values.

DIVERGENT STRABISMUS

Marshall M. Parks, M.D.

Strabismus is a condition of improperly aligned eyes. One of the more frequent types of strabismus encountered in children is divergent strabismus. Since divergent strabismus is observed usually as an eye that inter-

mittently drifts toward the temple, or more unusually as a constantly diverged eye, it is very aptly described by the term "wall eye."

ETIOLOGY

Divergent strabismus results from a divergent alignment of the eyes. It is unknown why some children should have divergent eyes whereas normally they are parallel, but the fact that the laterally directed eyes of the embryo swing to a frontal position during the fetal period may offer some clue as to the pathogenesis of this problem. It may be that during fetal life the divergent children fall short of reaching the ideal parallel position, retaining somewhat their embryonic laterally directed eyes. Furthermore, it is interesting to note how frequently this identical problem is observed in parents, ancestors, and siblings.

CLINICAL RECOGNITION

Divergent strabismus may be recognized as early as 6 months of age, or it may not attract attention until the age of seven years. Early in its development, especially in a very young child, the parents may describe the intermittent divergent eye they have been witnessing, but at the time the physician examines the little patient the strabismus is not disclosed to him. However, with the passage of weeks and months the validity of the parents' reported findings will eventually be borne out. The strabismus is most likely to be manifested at times of certain aggravating circumstances, such as fatigue, illness, emotional peaks, day dreaming, upon first awakening from a deep sleep, looking off at a distance, and while in a bright light or sunlight.

CLINICAL COURSE

The frequency and duration of the divergent occasions tends to increase during the tender years of development until a certain static pattern is reached. It may develop to the point that the eyes are constantly diverged. Or it may resolve into the pattern of eyes always being diverged while looking at distance but usually straight while fixating near objects. More often the problem remains essentially the same over a life time as it was when first noticed in infancy; i.e., one eye intermittently diverging regardless of whether looking at distance or near. However, almost never does the divergent strabismus tend to improve to the degree that it no longer is a clinical problem.

SYMPTOMS

Parents of a child who is intermittently divergent often remark about his apparent awkwardness. Such may be manifested by bumping into the sides

of doorways, ends of tables, falling and stumbling excessively, spilling and tipping things over, poor at catching a ball, losing his place while reading, etc. There also may be the comment about an irritable disposition. Both the awkwardness and irritability may be due to double vision experienced at which time the eyes are diverged.

ADAPTATION TO SYMPTOMS

Since the double vision is frustrating, clever little tricks are subconsciously used to mark this nuisance. The diverged eye may be closed, or covered with the hand. The younger child frequently rubs the "wall eye" as though he were trying to erase the confusing second image. However, by far the best solution to do away with the double vision is to converge the eyes sufficiently to make them straight. Hence, double vision is the stimulus for compensating for the divergent alignment.

As long as the pattern of intermittent divergence persists, diplopia is suffered when the eyes are not straight. However, if the divergent strabismus become constant, nature soon sets about to solve the constant double vision annoyance by some poorly understood, but ingenius adaptations. These adaptations occur at the cerebral level, most likely in the visual cortex. As a result of these adaptations, poor vision usually develops in the divergent eye.

These children must simultaneously put forth two things in order to converge their eyes to a parallel position. The first is visual attention. It is one thing to have the eyes open and quite another to see. Frequently, the retinas race their motors, so to speak, by dispatching a steady stream of visual information to the visual cortex which is pre-occupied by another activity—namely, imagination. Visual unawareness causes the child to not know the relative alignment of his eyes since he, at this time, is oblivious to all visual information, double vision included. Consequently, a "wall eye" is commonly observed while the patient is day dreaming, thinking of a fast excuse, excitedly telling a story, or at the peak of an emotion.

The second thing that is required to straighten the divergent eyes is a willingness to converge. Convergence is work. Where work is involved, there is a fatigue factor with which to contend. As the medial recti (the converging muscles) fatigue, a decision must be made as to whether it is less annoying to tolerate double vision or the discomfort of contracting fatigued muscles. Therefore, while fatigued, such as late in the day or before nap time, upon first awakening from a deep sleep, and while ill, the divergent strabismus is most likely to be manifested.

There are two additional factors that make it difficult to control the divergent alignment; (1) while looking off at a distance, and (2) while exposed to bright light.

The majority of divergent children have more difficulty controlling their problem when looking at distance as compared to viewing something near. This is attributed to the necessity of convergence while looking at near. Convergence also is necessary to straighten divergent eyes. Therefore, the normal convergence automatically required for near is of benefit to a divergently aligned child while looking at near. Unfortunately, no such added stimulus is available for distance vision.

Convergence is very difficult for everyone in bright illumination. This is a disadvantage to a divergently aligned child while exposed to bright sunlight. Furthermore, as the intensity of the illumination increases, so does the annoyance of double vision. Therefore, it is no wonder that these children are bothered while in bright sunlight. Since they cannot converge to overcome their diverged eyes and the resulting diplopia is most annoying, they immediately solve their diplopia by forcefully closing the deviating eye. Many times this is the only symptom that forces the parents to seek ophthalmological advice, they being unaware of intermittently diverged eyes.

TREATMENT

Glasses are of no value in the treatment of divergent strabismus short of compensating for any concomitant refractive error. It is totally impractical to prescribe prisms to be worn as spectacles that compensate for the divergent alignment since they distort the vision—making it blurred, and are very thick and heavy—being uncomfortable as well as unsightly.

Patching the good eye is necessary in order to force the poor eye to be used. With use, usually a somewhat normal visual acuity can be restored in the poor eye. As a word of caution, the "good eye" should not be patched unless the divergent strabismus is constant and the visual ability is definitely poor in the "wall eye." Patching to improve vision has no effect on straightening the eyes.

Exercises (orthoptics) are useful if the divergent strabismus has become constant. It is capable of teaching the constantly diverged child to overcome the cerebral adaptations that did away with the double vision and how to converge in order to compensate for the mal-alignment. These are complicated subjects and if orthoptics is to meet with any degree of success the child must possess a certain comprehensive ability. For this reason, orthoptics is usually unjustifiable prior to age six. Orthoptics never cures the problem. At best, it can only teach how to compensate for the strabismus. It is a valuable adjunct, but not the primary tool in curing divergent strabismus.

Surgery is the sheet anchor of the therapy. The insertions of certain extraocular muscles are changed so that the eyes are permitted to come to a

parallel position. The rewards of surgery are immediate and persist over a lifetime. Specifically they are; (1) a general improvement in the disposition and well being of the child since the frustation of double vision is done away with, and (2) cosmetic improvement since the "wall eye" appearance is eradicated.

The risk involved in surgical correction is nil. The eye is not entered so sight in no way is jeopardized. No skin incision is made and no scars are visible on the eyeballs a matter of a few months after surgery. Anesthesia is not a problem in the hands of a proficient pediatric anesthetist. The discomfort to the little patient is slight. The eyes are bandaged but for a few hours post-operatively. The child uses the eyes the day after surgery. They are light sensitive and lacrimate for three to four days and there may be discomfort upon moving the eyes that is comparable to moving a cut knuckle. Discharge from the hospital occurs the morning after surgery.

The indications for surgery are dependent more upon the frequency and severity of symptoms resulting from the divergent alignment rather than by any rigid rules applicable to certain amounts of divergence. Some patients are very annoyed by a rather small amount of divergence whereas others amaze the ophthalmologist with the quantity of divergence they always compensate for with seemingly little to no symptoms—perhaps only being discovered upon routine eye examination. The symptoms are both objective and subjective. The objective symptoms are the intermittent divergence observed by the family, as well as the rubbing, covering, or closing of an eye. The subjective symptoms are the complaints of double vision.

The age that surgery should be performed is, in general, as young as possible. There are two temporizing factors to take into consideration concerning this rule. First, the patient should be sufficiently co-operative to permit accurate examination by the surgeon so he can determine the amount of divergent alignment that requires surgical correction. Secondly, the problem of anesthesia safety must be weighed in the surgeon's mind. If the pediatric anesthesia is excellent, as it is in this hospital, elective strabismus surgery does not create unwarranted risks in young children—even those as young as eight to nine months of age. The surgeon must assume the responsibility of determining the competency of the anesthetist to give eye surgery anesthesias in young children before deciding what age child is safe to be operated upon with minimal risk.

After giving proper consideration to the above two factors, it still remains desirable to eradicate the divergent alignment at as early an age as possible. To permit the child to fight this issue unassisted exposes him needlessly to the frustation of double vision and the ensuing battle to overcome it, or his defeat by the divergent alignment with solution of the double vision by

development of certain cerebral adaptations which make the primary disorder all the more complicated to treat.

SUMMARY

Divergent strabismus is due to the eyes being aligned in a divergent position. It is compensated for by applying convergence until the eyes are straight. The annoyance of diplopia is experienced when the eyes are divergent. This is the stimulus to straighten the eyes. If the divergent alignment is not compensated for by convergence, the victim eventually adapts to the diplopia by acquiring abnormal seeing habits. The treatment is surgical correction of the divergent alignment. This ideally should be done at a young age. When the surgeon is convinced that his measurements of the divergent alignment are reliable and when he feels secure that the anesthesia risk is minimal, the time for surgery has arrived.

PSYCHOLOGICAL TESTING OF INFANTS AND PRESCHOOL CHILDREN

Emma M. Layman, Ph.D

In the practice of pediatrics, the physician is frequently called upon to evaluate the development and behavior of infants, and to serve as a guide and counselor to parents who are concerned about deviations in patterns of sleeping, eating, and elimination, as well as about problems in the areas of growth, maturation, and learning. When emotional disturbances occur in infancy, it is usual for parents to turn to the pediatrician for help with these, too. Occasionally the pediatrician feels the need for the assistance of the psychiatrist and/or the clinical psychologist in evaluating developmental and behavioral deviations in infants, although he is able to evaluate many of the problems in these areas without the assistance of other specialists.

After the infancy period is over, many parents tend to bring their children to the pediatrician less frequently, using the doctor's services principally when immunizations are needed and when the child is physically ill or injured. However, even when regular monthly trips to the pediatrician for examination, counseling, and guidance are discontinued by parents after the child is safely through his first year of life, the pediatrician usually *is* consulted about problems such as general developmental retardation, failure on the part of the child to acquire speech at the normal age, enuresis, thumb-sucking, temper tantrums, hyperactivity, sleep disturbances, psychosomatic illnesses, and other symptomatology in which there is a psy-

chogenic component. In some instances, the pediatrician will have insight into the difficulty and will be able to help the parents in handling it; in other instances, he will feel the need of another opinion to reinforce his own; in still other cases, he will wish to refer the patient to another specialist, for diagnosis and possible treatment.

Many communities are without the services of a child psychiatrist or a psychiatric clinic. Even in such communities, however, it is often possible to secure the services of a clinical psychologist, who may be employed by the public schools or a local college, may be attached to the State Department of Public Welfare, or may be in private practice. Although the services of a psychologist should not be considered as a substitute for those of a psychiatrist, the clinical psychologist is often able to make contributions which can be very helpful to the pediatrician.

The clinical psychologist of today is usually an individual with a Ph.D. in clinical psychology. (Some persons recognized as clinical psychologists do not have the Ph.D. but do have the equivalent in training and experience.) Unfortunately, in most states there are no legal means of preventing unqualified persons from calling themselves "psychologists." To protect the public from exploitation by charlatans the American Psychological Association has set up the American Board of Examiners in Professional Psychology, which issues diplomas to experienced practicing psychologists who have passed a series of written and oral examinations. These diplomas are analogous to those issued by the medical specialty boards. The Board issues an annual directory of "diplomates."* It is suggested that the pediatrician consult this directory in attempting to locate qualified psychologists, especially if he is not sure of the competency of those whose services are available.

PSYCHOLOGICAL TESTS

Although the clinical psychologist has been trained in techniques of interviewing, general behavioral observation, and psychotherapy, in the clinical setting he makes his most unique contribution by the use of diagnostic psychological tests. Cronbach[1] defines a psychological test as "a systematic procedure for comparing the behavior of 2 or more persons." This definition implies that a test involves a standardized procedure for administration, and that the results will be compared with certain standards or norms. It does not necessarily imply that there will be quantitative measurement involved. The present tendency is to regard the psychological test as a special kind of clinical interview, in which the patient interacts with the examiner as well as reacting to other environmental stimuli involved in

* A copy of this directory may be obtained from the American Psychological Association, Inc., 1333 Sixteenth Street, N. W., Washington 6, D. C.

and external to the test situation. The examiner, in interpreting the patient's test performance, considers the individual's total behavior in the test situation and the factors to which it is related, rather than confining himself to a mechanical scoring of test responses and comparison of these responses with those which are considered "normal."

Psychological tests are of various types. A classification in terms of functions or characteristics evaluated would list the following: (1) tests of general ability; (2) tests of special abilities and aptitudes; (3) tests of educational achievement; (4) tests of interests and attitudes; and (5) tests of emotional characteristics and personality trends. Some of these tests are highly "structured," and seek to evaluate the individual by means of scoring and interpreting his performance in response to specific questions or instructions which are so worded as to call for responses within a well defined framework. For example, the patient may be told to " answer 'yes' or 'no'," or he may be asked to "put these blocks in their right places" as fast as he can. Other tests are relatively unstructured, in the sense that the instructions permit a variety of responses and give the patient an opportunity to be creative. These relatively unstructured tests are termed "projective techniques," since the patient's responses are determined by his own highly personalized needs, impulses, conflicts, and characteristic ways of behaving, so that he "projects" these onto the stimulus material which in itself is relatively meaningless. Thus a vague ink blot might look like a bat, a soaring eagle, a Hallowe'en mask, the head of a devil, a leering monster, or a pair of vultures hovering over a helpless man; none of these answers would be considered incorrect if the patient were asked to tell what the blot looks like to him, but would tell something about the patient's characteristic patterns of perceiving, thinking, feeling, and acting.

INFANT TESTING

Although it is recognized that differences in personality manifest themselves in early infancy and emotional problems may occur during this period, psychological testing of infants has been confined largely to developmental evaluation. Among the tests devised for this purpose, the best known are the Gesell Developmental Schedules [2], the California First-Year Mental Scale [3], and the Cattell Infant Intelligence Scale[4]. The Gesell Schedules provide inventories of activities in terms of four categories of behavior: (1) motor, (2) adaptive, (3) language, and (4) personal-social. The other scales do not group the test items according to function, but arrange them in order of age placement.

Infant developmental scales have been quite widely used by adoption agencies, but with rather disappointing results, since developmental status at any time during the first year and a half of life does not have a high

correlation with measurable intelligence in later years. Reasons that infant developmental tests have little predictive value include the following: (1) These tests lean heavily on motor activities and evaluation of sensory perception, which in older children and adults have very low correlations with more complex mental functions; (2) in infancy, functions such as social judgment and the ability to do abstract thinking have not yet developed, so that it is not possible to evaluate them; (3) infants characteristically display fluctuations in rate of development, with normal babies differing quite markedly with respect to the ages at which spurts and plateaus in development occur; (4) differences due to motivational factors, emotional response to the examiner, and environmental distractions are extremely difficult to evaluate in the pre-verbal infant.

Whereas tests designed to evaluate development in infants are not of great usefulness for predicting future intelligence, in general they do an effective job of identifying as defective those with extremely low scores and identifying as potentially superior those with unusually high scores. Probably most pediatricians can make such identifications without the use of tests, but sometimes the pediatrician will find it helpful to arrange for a test to be given as a means of obtaining a supporting opinion that may make his own opinion more acceptable to parents.

Infant developmental tests have two important uses, other than that designated above. When such tests are given by a skilled clinical psychologist, and are analyzed in terms of the infant's performance on various parts of the scale, they may be very helpful in identifying possible cases of brain damage. When used in conjunction with other clinical data they also may be useful in picking up early signs of emotional disturbance, although this is not their primary purpose.

TESTS FOR CHILDREN OF PRESCHOOL AGE

Most textbooks on psychological testing list as tests for preschool children only highly structured tests of general ability or "intelligence." In recent years, however, clinical psychologists have been reporting the successful use with preschool children of projective tests similar to those used as an aid in diagnosing emotional problems in older children and adults[5].

Tests of General Ability

Intelligence tests given during the preschool period, from the age of 18 months to about 5 years, have a much greater predictive value than do the infant developmental tests, although some of the same factors which affect the validity and reliability of infant tests are still in the picture. An analysis of the preschool child's performance in different types of subtests, together with observation and interpretation of his behavior in the test situation,

often helps to determine the relative effects of heredity, organic brain damage, emotional disturbance, and cultural factors in accounting for the way in which the child functions.

Because the preschool child is usually quite active, has a short span of attention, and is interested in investigating the material aspects of his environment, most preschool intelligence tests make more use of "performance" items than of verbal items. Thus we find that tests for preschool children often include subtests involving pegboards, formboards, puzzles, pictures, balls, dolls, blocks, miniature toy animals, and other materials which the child views as toys. Most young children look upon the examination session as a play period and regard the different tests as "games."

There are available on the market materials for many tests suitable for use with preschool children. The Gesell and Cattell scales for infants include also test items and norms for preschool children. The Stanford-Binet Intelligence Scale[6], used mostly for school-age children, may be used for younger children who do not perform below a two-year level in any of the functions measured by the scale. Several intelligence scales are designed especially for preschool children. Among the most commonly used are the Merrill-Palmer Scale of Mental Tests[7] and the Minnesota Preschool Scale[8]. The Merrill-Palmer Scale is principally non-verbal, and so is especially appropriate for use with children who have not developed speech. Most intelligence tests yield results by which the examiner may compute a Mental Age and an Intelligence Quotient. (Gesell substitutes Developmental Age and Developmental Quotient.) However, often more meaningful is the examiner's analysis of the types of function in which the child does well or poorly.

A very useful tool for developmental evaluation of infants and preschool children who will not participate in test activities or who cannot do so because of some physical handicap is the Vineland Social Maturity Scale[9]. This scale was designed for use with individuals from infancy to the age of thirty years. It was constructed to serve as a supplement to an intelligence test, in order to distinguish between mental retardation with social incompetence and mental retardation in a socially adequate person. However, it has a high correlation with intelligence, and for the preschool child usually gives at least a rough approximation of the child's developmental level when an intelligence scale cannot be administered. The items of this scale represent progressive maturation in the areas of self-help, self-direction, locomotion, occupation, communication, and socialization.

Projective Techniques

Among the projective tests which have been found practical for use with preschool children are the following: (a) Rorschach test; (b) Lowen-

feld Mosaics; (c) Thematic Apperception Test and other picture story tests; and (d) "Draw-a-Person" Test. Analysis of children's spontaneous art productions and analysis of children's play also would be termed projective "techniques," but would not fall in the category of tests.

(a) *Rorschach Test.* The Rorschach test[10] is widely recognized as a very valuable instrument for gaining insight into the intellectual, emotional, and social characteristcis of adolescents and adults. Several careful studies[11, 12] have reported norms for children and some literature on the clinical interpretation of children's Rorschach protocols is beginning to appear[13], but considerably more research needs to be done before Rorschach protocols for children may be interpreted with the same degree of confidence as those for adults. Present indications are that the Rorschach technique is a usable clinical instrument with children as young as three years of age[14].

The Rorschach test materials consist of ten symmetrical ink-blot designs, printed on white cards. Five of the designs are gray, two are gray and red, and three are multi-colored. The cards are presented to the patient, one at a time, and he is asked to tell what each blot makes him think of—what it looks like to him. Later the patient is asked to indicate where he saw the various things named, and to tell what feature or features of the blot made him think of these things. Responses are scored in four categories: (a) the *location*, or the part of the blot to which the response was made; (b) the *determinant* of the response, such as color, shading, or form; (c) the *content*, such as animal, human, anatomy, or nature; and (d) whether the response is a *popular* or *original* one. Interpretation of the test is a very complex undertaking, and is based on interrelationships among the various scores as well as on the patient's behavior in the examination situation.

(b) *Lowenfeld Mosaics.* The mosaics test has been used quite extensively in England. It has not been widely used in the United States but is becoming more popular, although it is still not well standardized[14, 15, 16]. The recent publication of a comprehensive manual for this test[17] should increase its usefulness. With older children and adults the mosaics test reveals much about level of intellectual functioning, presence or absence of brain damage, degree of anxiety, and personality organization. When used with younger children, it is less revealing, but with children over four years of age it may be a valuable adjunct to other diagnostic techniques.

The test material for the mosaics consists of a rectangular tray with a raised edge, and a box of plastic tiles in five shapes, with each shape being in six different colors. In administering the test the examiner explains to the patient that there are tiles of different shapes and colors, and that each shape may be found in every color. Then the patient is asked to use any of these chips he wants, to make something on the tray. After he is finished he is questioned about what he has made and what he intended for it to be.

The forms and colors used, the nature of the configuration, and the patient's behavior while taking the test are taken into account in making an interpretation.

(c) *"TAT" and other Picture Story Tests.* The Murray Thematic Apperception Test (TAT)[18] consists of a series of pictures, with the patient being asked to tell a story about each picture. Research with this test indicates that the stories told are dictated by the experiences, needs, wishes, feelings, and conflicts of the person telling the stories, and that an analysis of the stories tells much about the psychological makeup of the individual.

Some of the pictures in the TAT series are especially suitable for use with young children, and the test has been found to be applicable to nursery school children[5]. Some clinical psychologists working with children, however, have felt the need of picture-story tests especially designed for children. The result has been the publication of several tests of the TAT variety, among which are the Symonds Picture Story Test[19] (for adolescents), the Michigan Picture Test[20] (for children aged 8 to 12), and the Children's Apperception Test (CAT)[21] (for children from 3 to 11).

The CAT contains ten pictures, each depicting animal figures dressed like people and engaged in human-like activities. The authors, Bellak and Bellak, claim that children can identify themselves more readily with animals than with persons, and these pictures are designed so as to call forth stories concerning problems in such areas as feeding, toilet training, sibling rivalry, oedipal conflicts, and aggression. Some clinicians report that older children do not respond well to the animal pictures, but at the preschool level these pictures may be used quite successfully.

(d) *"Draw-a-Person".* Many observations have been made about children's art productions in relation to development and as manifestations of personality characteristics. Analyses of the genetic stages in drawing have led to the use of drawing as a measure of intelligence. The best known of the tests of this type is the Goodenough Drawing Test[22], in which the child is told to make a picture of a man, as best he can. The test is scored on the basis of the presence of essential details which presumably indicate the child's level of perceptual differentiation with respect to a familiar object. The test is intended for children from 3½ to 13½ years of age. It requires no special equipment and is easy to administer, but does not have high correlations with other measures of intelligence. (When the "mental age" obtained on this test is significantly lower than that obtained on one of the intelligence scales, it usually reflects some emotional disturbance and/or visuomotor disturbance.)

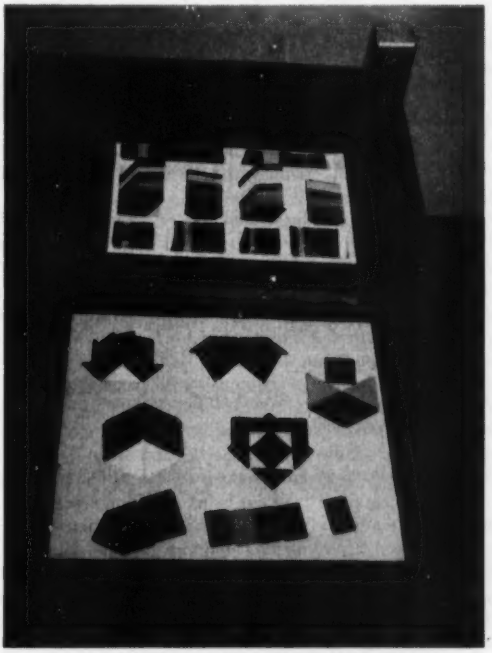
Possibly of greater clinical usefulness than the Goodenough test is the Machover "Draw-a-Person" test[23], despite the fact that attempts at statistical validation and standardization of this test have been unsatis-

factory. When the test is used with the preschool child, the patient is asked to "draw a person," or to "draw somebody." If the figure is a female, the child is then asked to "draw a man or a boy." If it is a male, he is asked to "draw a lady or a girl." Then he is asked to tell something about each person he has drawn, e.g. the age of the person, what kind of person it is, whether good or bad. Sometimes he will tell a story about the person. Both the figures and the child's verbalizations about them may tell much about his self-image and how he regards other members of his family.

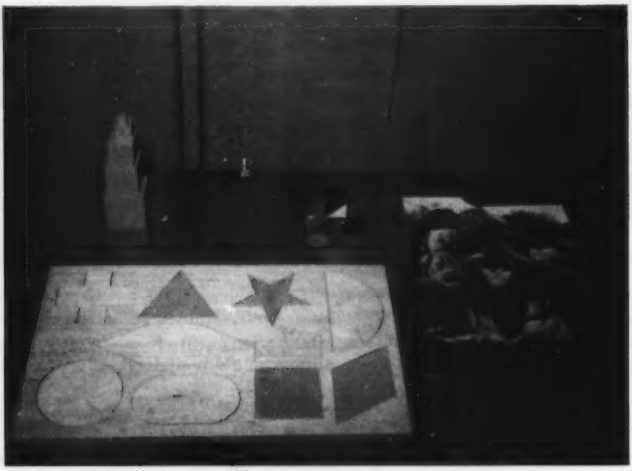
Case Illustration

The case of Rudy J. illustrates the use of psychological tests with young children. Rudy's age was 4 years, 10 months, and he was referred by a pediatrician for psychological testing as an aid in determining whether or not there might have been brain damage associated with lead poisoning, and as an aid in understanding the causes of pica and phobic symptoms presented by the child.

Rudy is the third of 4 boys, having brothers whose ages at the time of the study were 10, 6, and 3. The father, a truck driver, is alcoholic and gambles heavily. He deserted the family 1½ years before and has not been heard of since. After his desertion, the family became dependent on public assistance. The mother gives the im-



Mosaic Design by a 5 year old boy



Representative materials for Merrill-Palmer scale

pression of having limited intelligence, but had a tenth grade education. She is a person with little ability to individualize her children, who makes no decisions without consulting her caseworker. She has had frequent attacks of asthma. She did not notice Rudy's pica until asked to look for it. Rudy has always resented his younger brother.

Tests administered to Rudy included the Merrill-Palmer Scale of Mental Tests, Draw-a-Person Test, Mosaics, Rorschach, and Thematic Apprerception Test. Results reported by the psychologist were as follows:

(1) *Observations.* Rudy is a slender, blond boy of about average size with a large head, who was friendly and talkative, cooperated well, and put forth good effort on the various tests. He showed some dependence on examiner, asking, "How do you do this?" whenever anything seemed difficult. He was distracted by extraneous noises, frequently commenting, "I hear somebody," and seeming rather apprehensive. At one point he wanted to get up and look for his mother, but was reassured when told that his mother would not go home without him. His articulation is rather infantile for his age, and he is somewhat awkward in using his hands.

On the intelligence test Rudy displayed some slight difficulty with form perception and was below average in all tasks involving visuo-motor coordination. He was average in verbal functions. However, on the "action agent" subtest there was perseveration of the response "rat" in response to questions associated with bodily injury or hurt. ("What scratches?" "What bites?" "What stings?")

When asked to draw a man, Rudy first said that he could not do so. Then he offered to draw a house and placed a man inside the house. The man he drew was without a head, although he did have a mouth. When questioned concerning whether the man was good or bad, Rudy said the man was good because he cleaned up the floor. When asked about what a bad man does, he said, "A bad man gets you." The woman drawn by Rudy had feet and arms and breasts, but no head. The breasts Rudy called "milk." He said this was a good lady and that good ladies cook dinner. "Bad ladies hurt you."

On the Rorschach examination, Rudy perseverated on the response "boke," by which he meant "broke." He elaborated on this to have it apply to the broken condition of things which have been burned.

In handling the mosaics tiles, Rudy selected pieces at random, spreading them out over the tray in a manner similar to that employed by most 4 year olds. He seemed to ignore both form and color, taking whatever chips happened to come to hand.

On the TAT, Rudy evidenced his concern about things which were broken and also revealed a concept of people as being "mean."

(2) *Summary of Findings.* Rudy is a boy of dull-normal intelligence, with a mental age of 4 years, 1 month and an I.Q. of 85. His awkwardness and difficulty with form perception suggest the possiblity of some slight impairment in functioning due to organic brain damage; however, in certain types of situations emotional factors also appear to interfere with effective performance. Rudy is a very disturbed child with much anxiety about interpersonal relationships, a marked fear of bodily hurt, and a distorted concept of himself. He is interested in people but does not trust them. He looks upon them as potential sources of hurt to him, and considers them as basically "mean." Meanness and badness he especially associates with males, and his concept of himself is of a person who is bad. He turns to his mother for satisfaction of dependency needs, but she fails him in this area and he fears that in the end she may abandon him. Emotionally he is very immature, operating on a level of seeking oral satisfactions. There appears to have been deprivation of early dependency needs, which possibly partially accounts for the fact that Rudy has been eating paint, plaster, and other foreign substances. Fairly strong oral aggressive impulses are in the picture, with aggression being directed against both parents. Resentment of the father may be on the basis of the mother's attitude toward her husband as well as the father's abandonment of the family, whereas his hostility toward the mother is probably based on her failure to meet his needs and a conviction that she sent the father away. The fear of hurt appears to be tied in with Rudy's fear of retaliation and punishment because of his hostile feelings, and this, in turn, seems to increase his dependency.

These findings were used by the pediatrician to supplement his own information about the child and his family, providing a basis for counseling with the mother concerning the handling of the pica, appropriate ways of meeting the child's affectional needs, and more constructive ways of dealing with his aggressive impulses.

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